



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>H02G 15/18, 1/14</b>	<b>A1</b>	(11) International Publication Number: <b>WO 95/11542</b> (43) International Publication Date: 27 April 1995 (27.04.95)
<p>(21) International Application Number: PCT/US94/11143</p> <p>(22) International Filing Date: 30 September 1994 (30.09.94)</p> <p>(30) Priority Data: 5/263602 21 October 1993 (21.10.93) JP</p> <p>(71) Applicant (for all designated States except US): MINNESOTA MINING AND MANUFACTURING COMPANY [US/US]; 3M Center, P.O. Box 33427, Saint Paul, MN 55133-3427 (US).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): NAKAMURA, Tsunehisa [JP/JP]; 2-4, Koishikawa 2-chome, Bunkyo-ku, Tokyo 112 (JP). TANAKA, Kiyotaka [JP/JP]; 1-7-1-201, Higashirinkan, Sagamihara-city, Kanagawa-pref. 228 (JP). ISHIMURA, Tomomasa [JP/JP]; 8-3-1, Tsukushigaoka, Kita-ku, Kobe-city 651-12 (JP).</p> <p>(74) Agents: ANDERSON, David, W. et al.; Minnesota Mining and Manufacturing Company, Office of Intellectual Property Counsel, P.O. Box 33427, Saint Paul, MN 55133-3427 (US).</p>		<p>(81) Designated States: CA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p><b>Published</b> <i>With international search report.</i></p>
<p>(54) Title: CABLE SLEEVE</p> <div> </div> <p>(57) Abstract</p> <p>A covering device including an elastic covering member (15) in a hollow cylindrical shape, having an inner diameter in a contracted state smaller than an outer diameter of a cable portion to be sealed, and a core (11) in a hollow cylindrical shape, having an inner diameter larger than an outer diameter of the cable portion to be sealed, on the outer periphery of which the elastic covering member (15) is mounted in an expanded state. The elastic covering member (15) and core (11) are arranged while surrounding the cable portion to be sealed so that the contracted elastic covering member (15) closely covers the cable portion to be sealed when the core (11) is pulled out therefrom. A slip member (13) having a low surface friction is interposed between the inner periphery of the elastic member (15) and the outer periphery of the core (11) to facilitate removal of the core (11).</p>		

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## CABLE SLEEVE

### Field of the Invention

The present invention relates to a covering device  
5 for a cable or the like.

### Background of the Invention

In the prior art, when two cables are connected to  
10 each other, a cylindrical covering member is often mounted on the cable connection area for environmental protection and electrical insulation.

One example of devices for mounting such as the covering member is disclosed in Japanese Examined  
15 Patent Publication (Kokoku) No. 49-46190. According to this disclosure, the covering device has a hollow cylindrical core formed by releasably bonding a strip member to be in a spiral shape having an inner diameter larger than an outer diameter of the cable connection  
20 area, and a hollow cylindrical elastic covering member mounted on the outer periphery of the core in an expanded state.

In use, this covering device is placed at a position to cover the cable connection, and the strip  
25 member is pulled out so that the covering member closely covers the cable connecting portion as the core is gradually removed.

The strip member may be difficult to remove from the covering device due to snagging or friction and  
30 there is the risk of breakage of the strip. Further, such a device may be inconvenient to use in that it is necessary to pull out the strip member while rotating the same in the direction of the spiral, otherwise the strip member will be entwined with the cable. In  
35 addition, once the core is broken by removal of the strip member, the core cannot be reused.

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Summary of the Invention

Accordingly, an object of the present invention is to provide a reasonable and economical covering device  
5 by which the covering operation can easily be carried out and the reuse of waste material is possible.

To achieve the above object, the present invention provides a covering device comprising an elastic covering member in a hollow cylindrical shape, having  
10 an inner diameter in a contracted state smaller than an outer diameter of a cable portion to be sealed, and a core in a hollow cylindrical shape, having an inner diameter larger than an outer diameter of the cable portion to be sealed, on the outer periphery of which  
15 the elastic covering member is mounted in an expanded state, the elastic covering member and core being arranged while surrounding the cable portion to be sealed so that the contracted elastic covering member closely covers the cable portion to be sealed when the  
20 core is pulled out therefrom. A slip member having a low friction is interposed between the inner periphery of the elastic member and the outer periphery of the core.

Preferably, the slip member has a hollow  
25 cylindrical shape, and the slip member and the core are connected with each other in an end-to-end manner. Also, the core may be formed into a cylindrical shape by bending a rectangular sheet member and detachably connecting the opposite edges of the sheet member with  
30 each other.

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Brief Description of the Drawings

Figure 1 is a longitudinal side cross-sectional view of a covering device according to a first  
5 embodiment of the present invention.

Figure 2 is a view similar to that of Figure 1 with a core portion of the invention partially removed.

Figure 3 is a perspective view of a core of the embodiment of Figure 1.

10 Figure 4 is a longitudinal side sectional view of a covering device according to a second embodiment of the present invention with a core portion partially removed.

Figure 5 is a view similar to that of Figure 4  
15 with the core further removed.

Figure 6 is a perspective view of a core of the embodiment of Figure 4.

Description of the Preferred Embodiments

20

Figures 1, 2 and 3 illustrate a first embodiment of the present invention, and Figures 3, 4 and 5 illustrate a second embodiment.

According to the first embodiment, a core 11 of  
25 this embodiment is formed, as shown in Figure 3 by bending a rectangular piece of sheet made of thermoplastic resin such as polypropylene, polyamide, or polyethylene so that a pair of opposite edges thereof confront and can be detachably connected with  
30 each other, for example, by a male-female engagement, to form a hollow cylindrical tube.

The cylindrical core 11 has a sufficient mechanical strength and rigidity not to collapse due to reasonable external forces exerted on it and has an  
35 inner diameter larger than an outer diameter of a cable portion or the like to be sealed (not shown). As shown in Figure 1, on the outer periphery of the core 11, a

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hollow cylindrical slip member 13 is first mounted on the core 11 and, then a hollow cylindrical elastic covering member 15 is mounted onto the outer periphery of the slip member 13 while maintaining the covering member 15 in an expanded state.

The cylindrical slip member 13 is formed, for example, by a thin wall perforated material, meshed material, or other suitable material. Silicone oil, petroleum-based lubricant or the like may be impregnated in or surface-coated on these materials or in accordance with the present invention.

The cylindrical elastic member 15 is formed, for example, from a rubber material and has an inner diameter in a natural state (or a contracted state) smaller than an outer diameter of the cable portion or the like to be sealed (not shown).

The covering device as assembled in Figure 1 is placed surrounding the cable portion or the like to be sealed (not shown). As the core 11 is pulled out in the lengthwise direction, as shown in Figure 2, the elastic covering member 15, together with the slip member 13, closely covers the cable portion to be sealed while contracting in diameter. In this process, the core 11 can be easily and smoothly pulled out due to low friction of the slip member 13 interposed between the inner periphery of the elastic covering member 15 and the outer periphery of the core 11.

As stated above, according to the embodiment, the operation for pulling out the core can very easily be carried out because it is unnecessary to rotate the core 11 as it is removed. Also, there is no risk of breakage of the strip member forming the core. In addition, since the core 11 is developed in a sheet form, it can be readily detached from the cable or the like and repeatedly reused without any special attendance. Of course, the core 11 could be formed as

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a solid tube, but then it would have to be cut to be removed from the cable.

The slip member 13 may be left in the elastic covering member in a use for sealing a cable connecting  
5 portion, instead of being pulled out therefrom. Alternatively, if a better air-tightness or water-tightness is required in the cable connecting portion, the slip member may be removed from the elastic covering member. In the latter case, the slip member  
10 can easily be removed due to its excellent slipperiness even after the elastic covering member is contracted.

The second embodiment will be described below. As shown in Figure 4, a core 31 according to this embodiment is formed as a hollow cylindrical structure  
15 in which the core 11 and the slip member 13 of the first embodiment are fixed with each other in an end-to-end manner as an integral body. Contrarily, the core and the slip member may be fixed to each other at an overlapped area, provided it causes no obstacle  
20 against the removal of the core. Both the members may be formed as an integral body by an injection molding process or connected by means of an adhesive, adherent tape or mechanical fastener. The core 31 can be developed from a rectangular sheet by using a male-  
25 female engagement as in the embodiment of Figures 1-3. The core section 31a and the slippery section 31b may be prepared as an integral rectangular sheet from the same material, or may be separately prepared by different materials and then connected with each other  
30 to be in a rectangular form. The materials used in this embodiment are the same or similar to those used in the first embodiment.

The core section 31a of the cylindrical core 31 has a sufficient mechanical strength and rigidity not  
35 to collapse due to the outer force, and the slippery section 31b is formed of a thin perforated material, meshed material, or other suitable material.

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On the outer surface of the core section 31a of the core 31, an elastic covering member 15 is mounted in an expanded state, while the slippery section 31b in a folded position is interposed between the core  
5 section and the elastic covering member (see Figure 4).

The covering device thus-structured is placed to surround a cable portion or the like to be sealed (not shown). As the core 31 (core section 31a) is pulled out in the lengthwise direction, the elastic covering  
10 member 15 closely covers the cable portion to be sealed (not shown) while contracting its diameter, as shown in Figure 5. Since the slippery section 31b provided between the inner periphery of the elastic covering member 15 and the outer periphery of the core section  
15 31a has low surface friction, the core section 31a can be easily pulled out together with the slippery section 31b.

As stated above, according to this embodiment, it is possible to obtain excellent effects similar to  
20 those of the first embodiment. The slippery section 31b corresponding to the slip member 13 can be repeatedly reused.

Although not shown, a pull tab may be provided on the core for enhancing the pulling-out of the core.  
25 Since the slip member interposed between the inner periphery of the elastic covering member and the outer periphery of the core has a good slipperiness, the core is smoothly and easily pulled out, even though the elastic covering member is mounted thereon in an  
30 expanded state, whereby the elastic covering member can closely cover the cable portion or the like to be sealed while contracting its diameter.

When the slip member and the core are connected with each other in an end-to-end manner, the slip  
35 member can be pulled out together with the core.

As described, according to the present invention, it is possible to provide a reasonable and economical



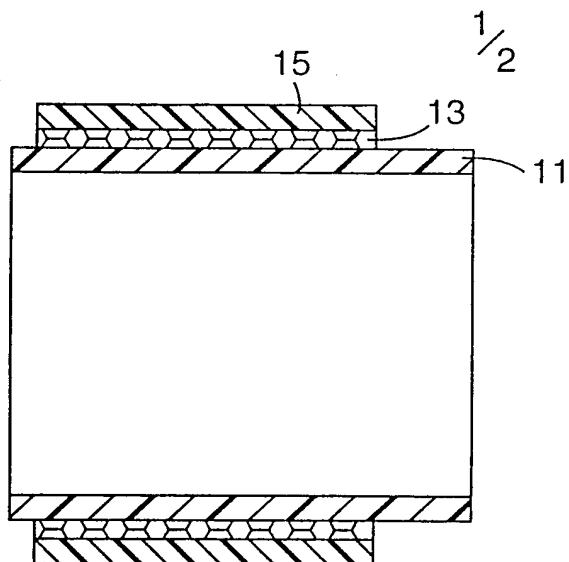
-7-

covering device capable of smoothly carrying out a covering operation and of repeatedly being reused.

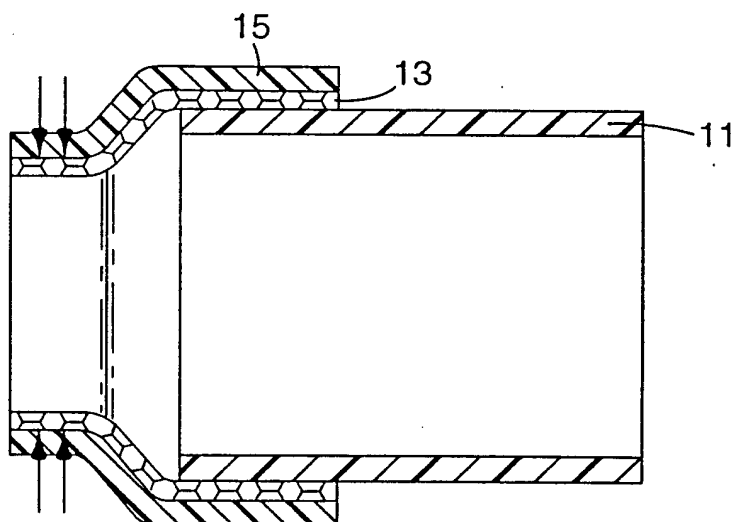
-8-

Claims:

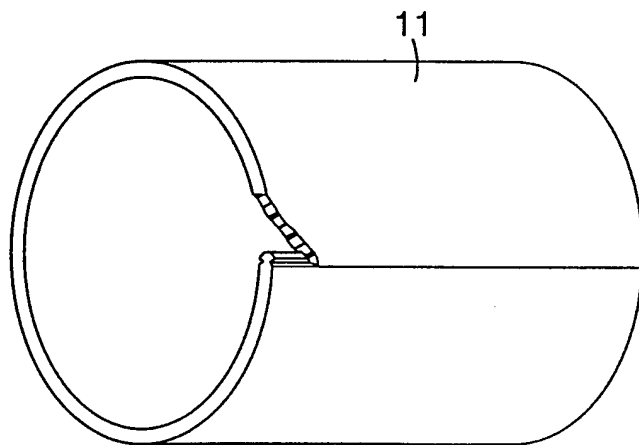
1. A covering device for a cable portion comprising:  
an elastic covering member in a hollow  
5 cylindrical shape, having an inner diameter in a  
contracted state smaller than an outer diameter of the  
cable portion to be sealed,  
a core in a hollow cylindrical shape, having  
an inner diameter larger than the outer diameter of the  
10 cable portion to be sealed, on the outer periphery of  
which the elastic covering member is mounted in an  
expanded state, and  
a slip member having a low surface friction  
if interposed between the inner periphery of the  
15 elastic member and the outer periphery of the core to  
permit said core to be easily removed from said  
covering member,  
said elastic covering member and core being  
arranged while surrounding the cable portion to be  
20 sealed so that the contracted elastic covering member  
closely covers the cable portion to be sealed when the  
core is pulled out therefrom.
2. A covering device as defined by claim 1,  
25 characterized in that the slip member has a hollow  
cylindrical shape.
3. A covering device as defined by claim 2,  
characterized in that the slip member and the core are  
30 connected with each other in an end-to-end manner.
4. A covering device as defined by claim 1, wherein  
the core is formed into a cylindrical shape by bending  
a rectangular sheet member and detachably connecting  
35 the opposite edges of the sheet member with each other.



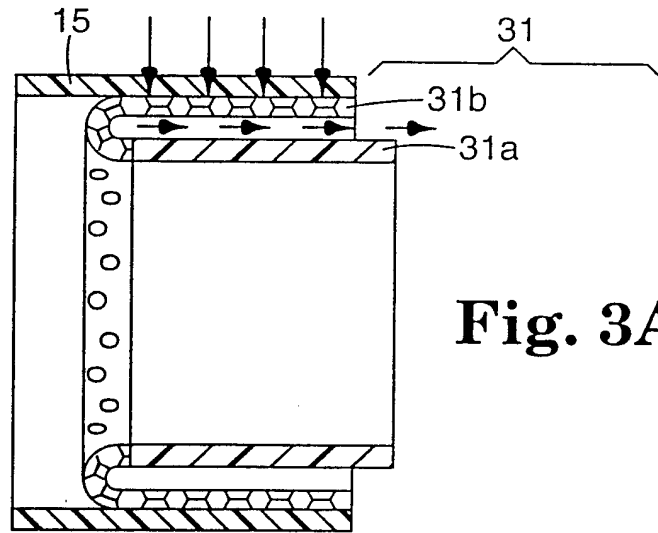
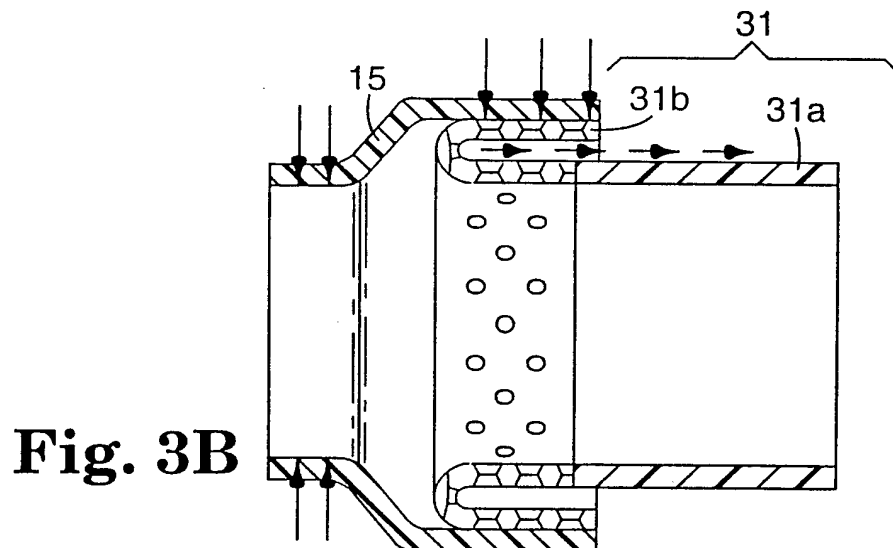
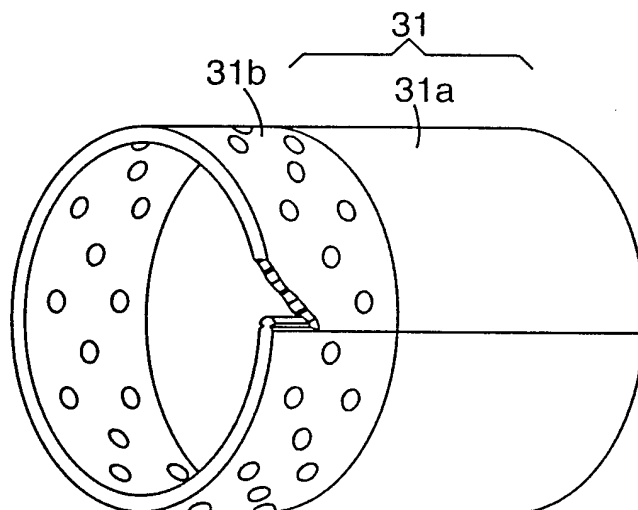
**Fig. 1A**



**Fig. 1B**



**Fig. 2**

**Fig. 3A****Fig. 3B****Fig. 4**

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 94/11143

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H02G15/18 H02G1/14

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H02G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	FR,A,2 592 825 (ARTEMA) 17 July 1987 see page 4, line 5 - page 5, line 24; claims 1,2,4,6; figures 1-9 ---	1,2 3
E	WO,A,94 23480 (RAYCHEM) 13 October 1994 see abstract; claims 1,3,5; figures 1-5 -----	1,2

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

18 January 1995

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# INTERNATIONAL SEARCH REPORT

information on patent family members

Inter. Application No

PCT/US 94/11143

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A-2592825	17-07-87	NONE	
WO-A-9423480	13-10-94	AU-B- 6433894	24-10-94

PUB-NO: WO009511542A1  
DOCUMENT-IDENTIFIER: WO 9511542 A1  
TITLE: CABLE SLEEVE  
PUBN-DATE: April 27, 1995

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APPL-NO: US09411143

APPL-DATE: September 30, 1994

PRIORITY-DATA: JP26360293A (October 21,  
1993)

INT-CL (IPC): H02G015/18 , H02G001/14

EUR-CL (EPC): H02G001/14 , H02G015/18

## ABSTRACT:

CHG DATE=19990617 STATUS=O>A covering device including an elastic covering member (15) in a hollow cylindrical shape, having an inner diameter in a contracted state smaller than an outer diameter of a cable portion to be sealed, and a core (11) in a hollow cylindrical shape, having an inner diameter larger than an outer diameter of the cable portion to be sealed, on the outer periphery of which the elastic covering member (15) is



mounted in an expanded state. The elastic covering member (15) and core (11) are arranged while surrounding the cable portion to be sealed so that the contracted elastic covering member (15) closely covers the cable portion to be sealed when the core (11) is pulled out therefrom. A slip member (13) having a low surface friction is interposed between the inner periphery of the elastic member (15) and the outer periphery of the core (11) to facilitate removal of the core (11).